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AUTHOR Schunk, Dale H.; Rice, Jo Mary
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ABSTRACT

Two experiments investigated the effects of sources of strategy information on children's acquisition and transfer of reading outcomes and strategy use. Children with reading skill deficiencies received comprehension instruction on main ideas. In the first experiment, the final sample comprised 33 students (21 fourth graders, 12 fifth gaders) drawn from one elementary school. The 19 boys and 14 girls ranged in age from 9 years 7 months to 12 years 7 months. Although different socioeconomic backgrounds were represented, children predominantly were lower-middle class. Ethnic composition of the sample was: 40% Hispanic American, 28% Black, 26% White, 6% Asian American. Teachers initially nominated 34 children for participation; one student was randomly excluded from the appropriate cell to equalize condition sizes. Subjects regularly received remedial reading comprehension instruction. Students had been placed in remedial classes by the school district because they scored at or below the 30th percentile on the reading subtest of the SRA (Science Research Associates) Survey of Basic Skills, 1985. Some students were taught a comprehension strategy, while others received strategy instruction and strategy value feedback linking strategy use with improved performance, and controls received comprehension instruction without the strategy. In the second experiment, students (N = 33, 13 boys, 20 girls) were drawn from one elementary school. Ages of the 15 fourth graders and 18 fifth graders ranged from 9 years 9 months to 12 years 4 months. All students were enrolled in remedial reading classes because they scored in the lowest 30th percentile of the reading subtest of the SRA Survey of Basic Skills. Subject characteristics and selection procedures were similar to those of Experiment 1. Ethnic composition of the sample was: 46% Hispanic American, 30% White, 18% Black, and 6% Asian American. These students were taught the comprehension strategy or received instruction without strategy training, after which they were given comprehension instruction on locating details. Some children were taught to modify the strategy; others did not employ the strategy on details. Results indicated that children who received strategy value feedback (in the first experiment) and strategy modification instruction (in the second experiment) demonstrated the highest self-efficacy, skill, strategy use, and transfer. Findings support the idea that remedial readers benefit from information about strategy usefulness. (Two tables of data are included; 45 references are attached.) (RS)

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Influence of Reading Comprehension Strategy Information on Children's Self-Efficacy and Skills

Dale H. Schunk

School of Education

University of North Carolina - Chapel Hill

Jo Mary Rice

Spring Branch (Texas) Independent School District

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Presented at the annual meeting of the American Educational Research Association, San Francisco, April 1992. Correspondence should be addressed to: Dale H. Schunk, School of Education, Peabody Hall CB3500, University of North Carolina, Chapel Hill, NC 27599.

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Abstract

Two experiments investigated the effects of sources of strategy information on children's acquisition and transfer of reading outcomes and strategy use. Children with reading skill deficiencies received comprehension instruction on main ideas. In Experiment 1, some children were taught a comprehension strategy; others received strategy instruction and strategy value feedback linking strategy use with improved performance; controls received comprehension instruction without the strategy. In Experiment 2, children were taught the comprehension strategy or received instruction without strategy training, after which they were given comprehension instruction on details. Some children were taught to modify the strategy; others did not employ the strategy on details. Children who received strategy value feedback (Experiment 1) and strategy modification instruction (Experiment 2) demonstrated the highest self-efficacy, skill, strategy use, and transfer. These results support the idea that remedial readers benefit from information about strategy usefulness.

Influence of Reading Comprehension Strategy Information on Children's Self-Efficacy and Skills

Learning strategies, or systematic plans used by learners to encode information and perform tasks (Weinstein & Mayer, 1986), can help students attend to tasks, focus on important features, rehearse and elaborate information to be remembered, monitor level of understanding and take corrective action when necessary, cue retrieval of information from memory, and create and maintain a favorable emotional climate and positive beliefs about learning (deBettencourt, 1987; Paris, Lipson, & Wixson, 1983; Schunk, 1989). These self-regulatory activities are associated with higher task performance (Borkowski, Estrada, Milstead, & Hale, 1989; Levin, 1986; Snowman, 1986).

Teaching students to use strategies often produces positive results (Borkowski, Johnston, & Reid, 1987). Students taught reading comprehension strategies may improve their achievement, attitudes, and strategic awareness, more than students not taught strategies (Brailsford, Snart, & Das, 1984; Oka & Paris, 1987; Paris, Cross, & Lipson, 1984; Pearson & Gallagher, 1983; Stevens, 1988). Strategy instruction seems especially beneficial for students with learning problems, who may not work on tasks systematically (Paris & Wixson, 1986; Raphael & McKinney, 1983).

At the same time, instruction does not ensure that children will maintain their use of a strategy over time or generalize its use to other tasks and settings (Garner, 1990; Pressley et al., 1990; Ringel & Springer, 1980). Failure to transfer may be due to students not realizing that strategy use promotes achievement or that the strategy is beneficial outside of the experimental context, not understanding how to modify the strategy to fit different tasks, doubting their ability to apply the strategy, or believing that the strategy is not as important for success as other factors (e.g., time

available, teacher assistance). To promote strategy transfer, researchers have suggested informing students about the uses of the strategy and how it improves performance (Borkowski, 1985; Paris, Wixson, & Palincsar, 1986).

Although there is evidence that providing reading comprehension strategy information can promote achievement outcomes (Paris & Wixson, 1986), little research has examined this issue among children with low reading skills. Schunk and Rice (1987) found that remedial readers in grades four and five benefited from multiple sources of information indicating how strategy use improved reading achievement. A later study showed that providing children with a goal of learning a comprehension strategy and feedback on their progress in using the strategy to answer questions led to higher comprehension skill and perceived capabilities than did giving children the goal without strategy information (Schunk & Rice, 1991). Unfortunately, neither study assessed children's actual strategy use so it is unknown whether gains in self-efficacy and skill were a direct result of children's continued use of the strategy. These studies also did not explore transfer of strategy use and achievement outcomes.

The present two experiments sought to address these concerns and to further clarify our understanding of the effects of sources of strategy information on children's acquisition and transfer of reading outcomes and strategy use. Elementary school children with severe reading skill deficiencies were taught a comprehension strategy to find main ideas. Achievement outcomes were assessed before and after instruction, and a maintenance test was given six weeks later. The two sources of strategy information we investigated were feedback on the value of the strategy and instruction on how to modify the strategy for use on different tasks.

In addition to their effects on comprehension and strategy use, we were interested in how sources of strategy information influenced <u>perceived</u>

self-efficacy, or children's personal beliefs about their capabilities to attain designated levels of performance (Bandura, 1986, 1989). Self-efficacy is hypothesized to affect choice of activities, effort expenditure, persistence, and achievement. Research shows that self-efficacy is an important variable in educational settings and can influence student learning (Schunk, 1989); however, research investigating the effects of strategy information typically has not included self-efficacy or related measures. Schunk and Rice (1987, 1991) found that sources of strategy information enhanced remedial readers' self-efficacy, but research is lacking on the relation of self-efficacy to transfer.

In Experiment 1, some children received strategy instruction; others received strategy instruction and information linking strategy use with improved performance; controls were given comprehension instruction but were not taught the strategy. We predicted that strategy value feedback would promote achievement outcomes and maintenance of strategy use (Borkowski, Weyhing, & Carr, 1988; Kurtz & Borkowski, 1987; Ringel & Springer, 1980; Schunk & Rice, 1987, 1991). Such feedback provides students with information on the usefulness of the strategy and conveys that continued use of the strategy will produce better comprehension (Paris et al., 1986). Students are apt to continue to apply a strategy when they believe it improves their achievement (Borkowski, 1985; Brown, Palincsar, & Armbruster, 1984). In the absence of strategy feedback, students may be less sure of whether they are improving or if strategy use is beneficial, and less likely to continue to apply the strategy when no longer required.

We also predicted that strategy value feedback would promote children's self-efficacy and that self-efficacy would relate positively to maintenance of strategy use and comprehension skill. The belief that one can effectively apply a strategy that enhances achievement can produce a sense of control over

learning, which enhances self-efficacy (Bandura, 1986; Schunk, 1989). Perceived control seems especially important for students with reading skill deficiencies, because many of them doubt their learning capabilities and believe they have little control over academic outcomes (Butkowsky & Willows, 1980; Licht & Kistner, 1986). Strategy value feedback conveys to children that they are learning the strategy, that strategy use is improving their performances, and that they are capable of further learning (Schunk, 1989; Schunk & Rice, 1987). Such feedback ought to raise self-efficacy and motivate children to continue to apply the strategy. Research with older students and normal achievers shows that self-efficacy relates positively to use of learning strategies (Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990).

Experiment 2 investigated the role of strategy modification instruction. Some children were taught the comprehension strategy for finding main ideas; controls received instruction without strategy training. Midway through the instruction, the task was changed to locating details. Half of the strategy training subjects were taught to modify the strategy to use for locating details; the other half received instruction without strategy training. Although there is some evidence showing benefits of strategy modification instruction (Borkowski & Cavanaugh, 1979), Experiment 2 was designed to extend this literature by examining the effects among poor readers, by including measures of self-efficacy, and by investigating transfer.

We predicted that strategy instruction on main ideas would promote acquisition and maintenance of achievement outcomes and strategy use, and that strategy modification instruction would prove maximally effective on the generalization task of locating details. Strategy use does not automatically generalize to other tasks, even when good strategy instruction is given and the strategy maintains itself (Borkowski, 1985). Transfer is especially

problematic among students with reading problems (Schunk & Rice, 1987). Strategy modification instruction informs students about the usefulness of the strategy on different tasks and can alleviate potential problems in modifying the strategy (Baker & Brown, 1984; Borkowski, 1985; Schunk, 1989). Such instruction also may create in students a sense of control over outcomes and raise self-efficacy, because the instruction can foster the belief that they know how to apply a strategy that raises their performances on different tasks. In turn, higher self-efficacy may motivate students to continue using the strategy. Without strategy modification instruction, students might not understand how to modify the strategy to fit other tasks, be unsure of how useful it would be, and doubt their capabilities to apply it.

Experiment 1

Method

Subjects. The final sample comprised 33 students (21 fourth graders, 12 fifth graders) drawn from one elementary school. The 19 boys and 14 girls ranged in age from 9 years 7 months to 12 years 7 months (M = 10.6 years). Although different socioeconomic backgrounds were represented, children predominantly were lower-middle class. Ethnic composition of the sample was: 40% Hispanic American, 28% Black, 26% White, 6% Asian American. Teachers initially nominated 34 children for participation; one student was randomly excluded from the appropriate cell to equalize condition sizes.

Subjects regularly received remedial reading comprehension instruction. Students had been placed in remedial classes by the school district because they scored at or below the 30th percentile on the reading subtest of the SRA Survey of Basic Skills (Science Research Associates, 1985). Twenty students were in their first year of enrollment in the remedial program, eleven students were in their second year, and two students were in their third year.

Approximately 25% of the sample received some instruction in English as a second language classes.

Pretest. The pretest comprised measures of self-efficacy and comprehension skill. The self-efficacy test assessed children's perceived capabilities for correctly answering different types of questions that tapped comprehension of main ideas. The efficacy scale ranged in 10-unit intervals from not sure (10) to really sure (100).

The reading materials included eight passages drawn from books A, B, and C, of Scoring high in reading (Cohen & Foreman, 1978). Passages ranged from 4 to 25 sentences, and each passage was followed by one to four questions (e.g., "What is the first paragraph mostly about?", "What is the most important idea in this story?") for a total of 20 questions. Four passages (nine questions) were appropriate for grade two students of average reading ability (book A), two passages (six questions) for grade three students (book B), and two passages (five questions) for grade four students (book C). Passages and questions corresponded in reading level to those on the skill test although they were not identical. The reliability of the efficacy measure was assessed in prior research (Schunk & Rice, 1987) using children comparable in age and reading skills to those in the present study. The test-retest reliability coefficient was .82.

Once children learned the meaning of the scale's direction and the different numerical values they read the eight passages. After they read each passage, the tester read its questions one at a time. For each question, students privately judged their capability of answering correctly questions of that type rather than whether they could answer that particular question. Students were not allowed to consult passages and questions did not appear on their test pages to preclude them from actually answering the questions.

Children were advised to be honest and mark the efficacy value that matched how they felt. Efficacy judgments were summed and averaged.

The comprehension skill test, which was administered immediately following the efficacy assessment, comprised 8 passages with 20 questions. Passages and questions were drawn from Scoring high in reading (Cohen & Foreman, 1978) and ranged in difficulty as described above. The tester presented children with each passage, along with its one or more multiple choice questions, one at a time. After children read each passage, they answered its questions without assistance or feedback. The measure of comprehension skill was the number of questions answered correctly.

Instructional program and experimental conditions. Children were assigned randomly within sex and grade level to one of three experimental conditions (n = 11 per condition): strategy instruction, strategy value feedback, instructional control. Students received 35-min instructional sessions over 15 consecutive school days, during which they worked on a packet of materials. Children assigned to the same condition met in small groups with a female teacher from outside the school. The instructional packet consisted of several reading passages, each of which was followed by one or more multiple-choice questions tapping comprehension of main ideas. Passages were drawn from different sources and were similar to those typically used by children's remedial teachers. Passages were ordered from least-to-most difficult; 40% of the material was appropriate for a second grade class of average reading ability, 40% for a third grade class, and 20% for a fourth grade class.

The experimental procedure for children assigned to the strategy instruction and to the strategy value feedback conditions was as follows. The teacher distributed the packet at the start of the first session. On a poster

board was printed the five-step reading comprehension strategy (Schunk & Rice, 1987):

> What do I have to do? (1) Read the questions. (2) Read the passage to find out what it is mostly about. (3) Think about what the details have in common. (4) Think about what would make a good title. (5) Reread the story if I don't know the answer to a question.

After distributing the packet, the teacher pointed to the poster board and modeled the strategy and its application by stating, "What do I have to do? Read the questions." The teacher read aloud the multiple-choice questions for the first passage while children followed along, after which she pointed to and verbalized steps (2) and (3). The teacher explained that details referred to bits of information and gave some examples, and said that while she was reading she would be thinking about what the details had in common. She then read the passage aloud. The teacher pointed to and verbalized step (4), and explained that trying to think of a good title helps to remember important ideas in a story. She stated some of the details in the story, explained what they had in common, and made up a title. The teacher then read aloud the first question and its multiple choice answers, selected the correct answer, and explained her selection by referring to the passage. She answered the remaining questions in the same fashion and reminded students of step (5).

Following this modeled demonstration, the teacher and students worked on another passage and its questions. The teacher instructed children to repeat aloud each step after she verbalized it. After children verbalized each of the statements, she selected one student to perform the corresponding actions (e.g., think of a title for the passage). The instructional format for the remainder of the first session and the rest of the instructional program proceeded in the same fashion except that the teacher did not explicitly model

the strategy and children did not verbalize every step prior to applying it. Instead, the teacher periodically referred to steps and occasionally asked children to verbalize them. The instructional procedure was scripted to insure standardized implementation; however, the teacher did not read the script but rather referred to it as necessary to ensure she had covered the material. Children in each of the three conditions spent comparable amounts of time academically engaged, so any differences in achievement outcomes are not due to varying amounts of time on task.

Strategy value feedback linked children's successes at answering comprehension questions with their proper application of the strategy. Each child assigned to this condition received feedback 3-4 times during each instructional session. The teacher delivered feedback after a child properly performed a step or answered a question correctly with such statements as (Schunk & Rice, 1987): "You got it right because you followed the steps in the right order," and, "You've been answering a lot more questions correctly since you've been using these steps." Strategy value feedback should not be confused with performance feedback that all students received concerning the accuracy of their answers to questions (e.g., "That's correct").

Students assigned to the instructional control condition received the same amount of instruction as students in the other two conditions except that it did not include the comprehension strategy. The teacher worked through the passages with their questions in the same fashion as in the other conditions except that the strategy was not displayed and the teacher never referred to the steps. This condition controlled for the effects of instruction included in the other conditions.

Posttest. On completion of the instructional program children received the posttest. The self-efficacy test was identical to that of the pretest. For the comprehension skill test, a parallel form of the pretest was used to

eliminate potential effects due to passage familiarity. Reliability was assessed during prior research (Schunk & Rice, 1987); children's scores on these parallel forms correlated highly (r = .87).

Maintenance test. Six weeks following the posttest the tester administered the maintenance test, which assessed self-efficacy, comprehension skill, and strategy use. The self-efficacy test was identical to that of the pretest. The pretest version of the comprehension skill test was employed. We felt that since 10 weeks had elapsed between the pretest and maintenance test potential effects due to children's selective memory of passages and questions would be minimal.

Strategy use was assessed with a think-aloud procedure. The tester met privately with each child and stated that she was interested in what children think about while reading and answering questions. The child was given a reading passage followed by a question to answer. The passage and question were appropriate for third-grade children of average reading ability. Children were asked to work on the passage and question in the same way they did during instruction. This assessment represented children's prompted rather than spontaneous strategy use, although the tester did not repeat the strategy. The tester wrote down all student verbalizations that were not a literal reading of the passage or question. She reminded students if they did not verbalize for several seconds (e.g., "Be sure to say aloud everything you read and think about").

Verbalizations were scored by two raters for the presence in the correct order of the five steps in the strategy. One point was awarded for each step or a close approximation. Raters agreed on 31 (94%) of the 33 transcripts; scores on the remaining two transcripts were averaged.

Results

Means and standard deviations are presented by condition in Table 1. Preliminary analyses of variance (ANOVAs) yielded no significant between-conditions differences on pretest measures or SRA reading scores. There also were no significant differences on any measure due to sex or grade level. Experimental conditions did not differ in the number of passages completed during instruction.

Insert Table 1 about here

Posttest self-efficacy and skill were analyzed with a multivariate analysis of covariance (MANCOVA); experimental conditions constituted the treatment factor and the corresponding pretest measures served as covariates. MANCOVA yielded a treatment effect, Wilks's lambda = .558, $F(4, 54) = 4.57$, $p < .01$. ANCOVA applied to posttest self-efficacy was significant, $F(2, 29) = 8.77$, $p < .01$, $MS_e = 137.09$. Posttest means evaluated with Dunn's multiple comparison procedure (Kirk, 1982) showed that strategy value feedback children judged self-efficacy higher than strategy instruction and control students (ps $< .01$). Posttest skill was analyzed with ANCOVA and yielded a treatment effect, $F(2, 29) = 5.04$, $p < .05$, $MS_e = 7.99$. The strategy value feedback condition demonstrated higher skill than the other two conditions (ps $< .05$).

MANCOVA applied to maintenance test self-efficacy and skill using pretest scores as covariates yielded a treatment effect, Wilks's lambda = .641, $F(4, 54) = 3.36$, $p < .05$. Separate ANCOVAs revealed treatment effects for maintenance test self-efficacy, $F(2, 29) = 5.55$, $p < .01$, $MS_e = 178.26$, and skill, $F(2, 29) = 4.68$, $p < .05$, $MS_e = 6.65$. Strategy value feedback children demonstrated higher self-efficacy and skill than did students in the strategy instruction and control conditions (ps $< .05$), which did not differ.

Think-aloud data were analyzed with ANOVA; the three experimental conditions constituted the treatment factor. This analysis was significant, $F(2, 30) = 44.72$, $p < .001$, $MS_e = .86$. Students assigned to the strategy instruction and strategy value feedback conditions verbalized more steps than control students ($ps < .01$); strategy value feedback students verbalized more steps than strategy instruction children ($p < .05$).

Correlational analyses were conducted to gain information on the relations between theoretically relevant variables. Given the large number of correlations, only those attaining significance at the $p < .01$ level are reported. Posttest self-efficacy was positively related to posttest skill, maintenance test self-efficacy and skill, and number of strategic steps verbalized during the think-aloud assessment (range of $rs = .50$-$.64$). Posttest skill correlated positively with maintenance test skill, $r = .61$. Maintenance test self-efficacy and skill were positively correlated, $r = .47$, and SRA score was positively related to pretest skill, $r = .62$.

Experiment 2

Method

Subjects. Students ($N = 33$, 13 boys, 20 girls) were drawn from one elementary school. Ages of the 15 fourth graders and 18 fifth graders ranged from 9 years 9 months to 12 years 4 months ($M = 11.1$ years). All students were enrolled in remedial reading classes because they scored in the lowest 30th percentile of the reading subtest of the SRA Survey of Basic Skills. Subject characteristics and selection procedures were similar to those of Experiment 1. Ethnic composition of the sample was: 46% Hispanic American, 30% White, 18% Black, 6% Asian American. Teachers initially nominated 34 children for participation; one student was randomly excluded from the appropriate cell to equalize cell sizes.

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Pretest. Except as indicated below, the pretest, instructional, posttest, and maintenance test materials and procedure of Experiment 1 were used in this study. The pretest included measures of children's self-reported use of the steps in the comprehension strategy, self-efficacy and skill on comprehension of main ideas and on comprehension of details. The strategy use instrument included five scales; each ranged in 10-unit intervals from not at all (0) to a whole lot (100). The scales were labeled, read the questions, read the passage, pay attention to keywords and details, reread and answer each question, reread passage when I cannot answer a question. Children privately marked how often they did each of these things when they answered questions about passages.

The self-efficacy and skill assessments of main ideas were identical to those of Experiment 1. The self-efficacy and skill tests on details were drawn from previous research (Schunk & Rice, 1985). Their formats and difficulty levels were similar to the self-efficacy and skill tests on main ideas. Each test consisted of ten passages ranging from 5 to 21 sentences; each passage was followed by one to four questions for a total of 20 questions that tapped comprehension of details (e.g., "When did this story take place?", "Who entered the house?"). The reliabilities of these measures were determined in previous research (Schunk & Rice, 1985) using children comparable to those in the present study. Test-retest reliability for the self-efficacy test was $r = .78$. Children's scores on the two parallel forms of the skill test correlated $r = .81$.

Materials and procedure. Children were assigned within sex and grade level to one of three conditions: strategy instruction, strategy modification, instructional control. Children received 10 instructional sessions on finding main ideas, followed by 10 sessions on locating details.

For the main ideas sessions, children assigned to the strategy instruction and the strategy modification conditions were taught the following strategy:

> What do I have to do? (1) Read the questions. (2) Read the passage to find out what it is mostly about. (3) Think about what the details have in common and what would make a good title. (4) Reread each question and answer that question. (5) Reread the passage if I don't know the answer to a question.

The format of the instructional sessions on main ideas for students in these two conditions was identical to that of strategy instruction students in Experiment 1. The format of the main ideas sessions for instructional control students was identical to that of instructional control students in Experiment 1. These students received comprehension instruction but were not taught the strategy. Children in all three conditions received performance feedback on the accuracy of their answers but no child received strategy value feedback.

Beginning with the eleventh session, children assigned to the strategy modification condition were taught to modify the strategy for details. The modified strategy was identical to that above except that step 3 was replaced with, "Look for key words." At the start of the eleventh session, the teacher explained that beginning today they would be trying to answer questions that asked about details in what they read. The teacher stated that details referred to bits of information and answered such questions as, "Who went to the park?" and "What did Lisa do?" The teacher stated that by changing step 3 the steps could be used to locate details. The teacher stated the new step 3 and explained that key words referred to material in the passage addressed in the questions. From that point on, the instructional format in the eleventh and remaining sessions was identical to that given to strategy instruction students during sessions on main ideas (described in Experiment 1) except that comprehension questions asked about details.

Children assigned to the strategy instruction and instructional control conditions received instruction on locating details but were not taught the modified strategy. The instructional format was similar to that used with instructional control students during the main ideas sessions (described in Experiment 1) except that questions asked about details. The strategy was not displayed, the teacher did not refer to steps, and she never linked children's actions with the strategy.

Posttest. The posttest format was identical to that of the pretest; children received the strategy use self-report measure, followed by the self-efficacy and skill tests on main ideas and details. The parallel form of the skill test was used.

Strategy use also was assessed with a think-aloud procedure that was identical to that used in Experiment 1 except that children were given one passage and question each for main ideas and for details. The tester recorded children's verbalizations, which were scored by two raters for the presence of the strategy's steps in the correct order. Raters agreed on 30 of the 33 (91%) main idea transcripts, and on 29 of the 33 (88%) details transcripts; disagreements were averaged.

Maintenance test. This test, which was administered six weeks following the posttest, included the self-reported strategy use measure, self-efficacy and skill tests on main ideas and details, and the think-aloud assessment. The procedure was identical to that of the posttest. The pretest form of the skill test was employed.

Results

Means and standard deviations are shown in Table 2. Preliminary ANOVAs yielded no significant between-conditions differences on pretest measures or on SRA reading scores. There were no significant differences on any measure due to sex or grade level. The three experimental conditions did not differ

in the number of passages completed during instruction. Within each experimental condition there were no significant differences at each phase (pretest, posttest, maintenance test) between self-efficacy scores on main ideas and details or between skill scores on main ideas and details; therefore, data were pooled across categories. There also were no significant within-condition differences at each phase between the five self-report scales; data were pooled across scales. Verbalizations during the think-aloud posttest and maintenance test assessments did not differ between main ideas and details passages; thus, verbalizations were pooled across categories.

Insert Table 2 about here

Posttest self-efficacy and skill were analyzed with MANCOVA using pretest measures as covariates and the three conditions as the treatment factor. This analysis was significant, Wilks's lambda = .555, $F(4, 54) = 4.62$, $p < .01$. The posttest self-efficacy ANCOVA yielded a between-conditions difference, $F(2, 29) = 6.46$, $p < .01$, $MS_e = 231.01$. Strategy modification children judged self-efficacy higher than control students, $p < .01$. Posttest skill also yielded a significant ANCOVA, $F(2, 29) = 9.53$, $p < .01$, $MS_e = 5.57$. The strategy modification condition demonstrated higher skill than the strategy instruction ($p < .05$) and control ($p < .01$) conditions.

ANCOVA applied to the posttest self-reported strategy use measure, using the pretest score as the covariate, yielded a treatment effect $F(2, 29) = 11.42$, $p < .001$, $MS_e = 117.71$. Strategy modification ($p < .01$) and strategy instruction ($p < .05$) students reported greater strategy use than control students. The think-aloud verbalizations yielded a significant ANOVA, $F(2, 30) = 31.94$, $p < .001$, $MS_e = .31$. Strategy modification students verbalized

more steps than strategy instruction ($p < .05$) and control ($p < .01$) children. Strategy instruction students verbalized more steps than controls ($p < .01$).

MANCOVA applied to maintenance test self-efficacy and skill, using pretest measures as covariates, was significant, Wilks's lambda = .453, $F(4, 54) = 6.55$, $p < .001$. Maintenance test self-efficacy yielded a significant ANCOVA, $F(2, 29) = 9.11$, $p < .01$, $MS_e = 138.21$. Strategy modification children judged self-efficacy higher than students in the other conditions (ps < .01). Maintenance test skill was analyzed with ANCOVA and revealed a between-conditions difference, $F(2, 29) = 10.40$, $p < .001$, $MS_e = 5.28$. The strategy modification condition outperformed the strategy instruction ($p < .05$) and control ($p < .01$) conditions.

The maintenance test self-report measure was analyzed with ANCOVA using the pretest score as the covariate; this result was significant, $F(2, 29) = 7.69$, $p < .01$, $MS_e = 135.62$. Strategy modification subjects reported greater strategy use ($p < .01$) than did controls. Maintenance test verbalizations were analyzed with ANCOVA using posttest verbalizations as the covariate; this analysis was significant, $F(2, 29) = 10.23$, $p < .001$, $MS_e = .41$. Strategy modification children verbalized more steps than students in the other conditions (ps < .01); strategy instruction children verbalized more steps than controls, $p < .05$.

Correlations attaining significance at the $p < .01$ level are as follows. Posttest self-efficacy related positively to posttest skill and verbalizations and to maintenance test self-efficacy and verbalizations (range of rs = .48-.69). Posttest skill correlated positively with posttest and maintenance test verbalizations and with maintenance test skill (range of rs = .55-.57). Posttest self-reported strategy use related positively to posttest and maintenance test verbalizations and with maintenance test self-reported strategy use (range of rs = .50-.69). Maintenance test verbalizations related

positively with posttest verbalizations and with maintenance test self-efficacy, skill, and self-reported strategy use (range of *rs* = .56-.73).

Discussion

These results show that providing remedial readers with sources of strategy information enhances self-efficacy, skill, strategy use, and transfer of achievement outcomes. The strategy value feedback and strategy modification treatments were comprehensive in that they included instruction, strategy training, and information designed to promote self-regulation of strategy use and perceptions of capabilities. It was not simply the number of instructional components that made the difference, but rather what these components taught students and the beliefs they engendered (Schunk & Rice, 1987). Researchers stress that cognitive skills instruction should include practice in applying a strategy, instruction in self-regulated implementation and monitoring of strategy use, information on strategy value and the range of tasks to which the strategy can be applied, and information designed to enhance students' perceived control over reading outcomes (Baker & Brown, 1984; Borkowski et al., 1987; Oka & Paris, 1987).

In Experiment 1 we found that strategy value feedback led to the highest self-efficacy, skill, and maintenance of strategy use. Such feedback conveys to students that the strategy is effective, they are making progress in learning, and they are capable of continuing to improve their skills. These beliefs are validated as students successfully apply the strategy. Higher self-efficacy, coupled with knowledge of how to use the strategy and the belief that it raises performance, can produce strategy maintenance (Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1990).

Strategy value feedback seems especially beneficial with poor readers, because they may not understand that a strategy is useful (Myers & Paris, 1978; Oka & Paris, 1987). When students understand how to apply a strategy,

believe they can apply it successfully, and know that it improves performance, they are apt to experience a greater sense of control over reading outcomes. Perceived control is important, because remedial readers often view their achievement outcomes as beyond their control (Butkowsky & Willows, 1980).

In Experiment 2 we found that strategy modification instruction led to the highest self-efficacy, skill, and strategy use. These results support the point that students benefit from strategy modification instruction because they may not automatically maintain use of strategies or modify them to fit other tasks (Borkowski, 1985; Borkowski & Cavanaugh, 1979). Strategy modification instruction highlights the general usefulness of the strategy, which should promote continued use of it. Such instruction also may create in students the belief they are capable of successfully applying the strategy, which can raise perceived control and self-efficacy (Schunk, 1989). Efficacy beliefs, coupled with knowledge of the strategy's usefulness, can facilitate performance, maintenance and generalization (Paris, Jacobs, & Cross, 1987).

In both studies strategy instruction students did not differ from controls on self-efficacy or skill. Although these findings conflict with other research (Borkowski et al., 1987; Oka & Paris, 1987), they are supported by prior studies showing that strategy instruction may not raise outcomes in remedial readers (Schunk & Rice, 1987, 1989). Interestingly, we found that strategy instruction students reported greater strategy use and verbalized more steps during think-aloud assessments than controls. Perhaps over a longer time this enhanced strategy use would raise self-efficacy and skills.

Our results may have limited generalizability because the participants were remedial readers. Such students benefit from strategy instruction combined with information conveying the usefulness of the strategy and that students are improving their skills (Borkowski et al., 1987; Schunk & Rice, 1987). In contrast, good readers typically work on tasks strategically,

monitor their performances and self-regulate strategy use depending on task conditions, and feel capable of performing well (Oka & Paris, 1987; Paris et al., 1987). Although good readers might benefit from the present procedures, such procedures are apt to be more effective with remedial students.

Future research might examine students' strategy use over extended periods to determine how strategy use changes as skills and self-efficacy develop. Research also might examine the effects of other sources of strategy information. Any procedure requiring extensive cognitive activity by learners has the potential to enhance strategy transfer by teaching students to self-regulate their performances and by conveying information about strategy usefulness (Borkowski & Cavanaugh, 1979). For example, self-instructional training comprises modeling, guided practice, faded self-guidance (i.e., students' verbalizations are faded to whispers), and covert (silent) self-instruction (Meichenbaum & Asarnow, 1979). This procedure can highlight the link between strategy use and improved performance, help students monitor their comprehension, and foster positive beliefs about learning (Borkowski et al., 1987; Graham & Harris, 1989).

The present research supports the idea that self-efficacy is not merely a reflection of prior performances (Bandura, 1986). Experimental conditions did not differ in the number of passages completed during instruction but children who received sources of strategy information judged self-efficacy higher. These studies also show that self-efficacy is positively related to skillful performance. Personal expectations for success are viewed as important influences on achievement by different theories (Bandura, 1989; Covington, 1987; Weiner, 1985).

This research has implications for classroom practice. Many strategy training programs are effective, but students discontinue using the strategy when no longer required to apply it. Strategy training easily can be

incorporated into regular comprehension instruction, along with sources of strategy information. The present results suggest that strategy value feedback and strategy modification instruction are useful procedures for fostering skills, self-efficacy, and maintenance and generalization of strategy use among students with reading skill deficiencies.

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Table 1

Means (and Standard Deviations) - Experiment 1

Measure	Phase	Experimental Condition: Strategy Instruction	Strategy Feedback	Control
Self-Efficacy	Pretest	62.8 (17.4)	66.0 (14.9)	62.8 (10.2)
	Posttest	70.5 (13.4)	87.5 (8.9)	69.4 (12.8)
	Maintenance Test	68.8 (17.0)	86.2 (11.9)	71.4 (9.6)
Skill	Pretest	5.7 (1.7)	6.4 (1.7)	6.5 (2.9)
	Posttest	7.9 (3.1)	10.8 (2.2)	7.2 (3.3)
	Maintenance Test	7.8 (2.6)	10.6 (2.6)	7.5 (2.8)
Strategy Use (Think Aloud)	Maintenance Test	2.8 (1.4)	3.9 (0.8)	0.2 (0.2)
SRA Reading	---	13.1 (7.8)	14.4 (11.0)	14.7 (17.9)

Note. $N = 33$; $n = 11$ per condition. Self-efficacy means represent the average judgment per question; range of scale is 10(low) to 100. Skill means represent the number of correct answers on 20 questions. Strategy use score is the mean number of strategic steps verbalized in the correct order; range is 0 to 5. SRA is mean percentile score.

Table 2

Means (and Standard Deviations) - Experiment 2

Measure	Phase	Experimental Condition: Strategy Instruction	Strategy Modification	Control
Self-Efficacy	Pretest	66.6 (10.2)	64.0 (13.3)	64.0 (10.4)
	Posttest	72.6 (21.9)	88.1 (10.7)	65.3 (8.7)
	Maintenance Test	72.9 (11.2)	90.2 (11.9)	70.4 (11.9)
Skill	Pretest	8.4 (1.9)	7.9 (2.8)	8.4 (2.0)
	Posttest	9.2 (2.6)	12.4 (2.2)	8.2 (2.1)
	Maintenance Test	8.8 (2.8)	11.8 (2.4)	7.7 (2.1)
Strategy Use (Self-Report)	Pretest	51.1 (15.0)	54.7 (8.5)	54.7 (8.0)
	Posttest	66.5 (12.1)	74.2 (5.8)	52.4 (12.7)
	Maintenance Test	62.4 (19.0)	74.9 (7.4)	55.4 (10.1)
Strategy Use (Think Aloud)	Posttest	3.8 (0.6)	4.5 (0.6)	2.6 (0.4)
	Maintenance Test	3.2 (0.8)	4.5 (0.5)	2.5 (0.5)
SRA Reading	---	17.1 (15.3)	18.3 (14.2)	15.4 (18.5)

Note. N = 33; n = 11 per condition. See Table 1 for description of self-efficacy, skill, and strategy use (think-aloud) measures. Range of strategy use (self-report) measure is 0(low) to 100.